LARP Collaboration Meeting
April 2005

BNL Dipole Magnet Development Plan

M. Anerella

Goals

12T Common Coil Open Midplane Tests:

Goal: Establish open midplane working principle

- Model internal support to mimic LARP magnet structure
- Use existing geometry 12T cold mass
- First quick (FY06) feedback on basic principle

Goals

Dipole Open Midplane Proof of Principle (POP) Magnet:

Goal: Establish basic principles in short "simplified D1"

- Derivation of R. Gupta "baseline" D1 design, with simplifications:
  - Shared geometry, strain, construction methods, etc.
  - Small bend radius coil blocks excluded – Can be React & Wind
  - Current grading ignored – NO shunts or splices needed
  - 1M length
  - Cold mass only

Goals

Long Magnet Wind & React Coil R&D:

Goals: develop in-house expertise to support LARP program

- 0.5M coils for initial learning (existing infrastructure; tooling, oven, etc. – no equipment needed)
- 1M coils (moderate tooling only - no oven needed)
- 4M coils (need new oven & equipment)

Goals

D1 Open Midplane Model Magnet:

Goals: Validate all critical design features:

- Full geometry, forces, strain, etc.
- Small bend radius coil blocks (R&W)
- Current grading , associated shunt leads
- “long” (4M) length
- Cold mass only

4 Year Plan (milestones)

- FY06
  - Design
    - 12T support
    - 1M POP magnet, magnet tooling
  - Make/Buy
    - POP superconductor, coil parts
    - POP coil tooling
  - Assembly
    - 12T Open Midplane
    - ½ M W&R coils
  - Test
    - 12T Open Midplane
    - ½ M W&R coils

4 Year Plan (milestones)

- FY07
  - Design
    - 1M POP test tooling
    - 1M, 4M W&R Coil Tooling
  - Make/Buy
    - POP magnet parts
    - POP magnet tooling
    - W&R coil parts & tooling
  - Assembly
    - POP cold mass
    - 1M W&R coils
  - Test
    - 1M W&R coils

4 Year Plan (milestones)

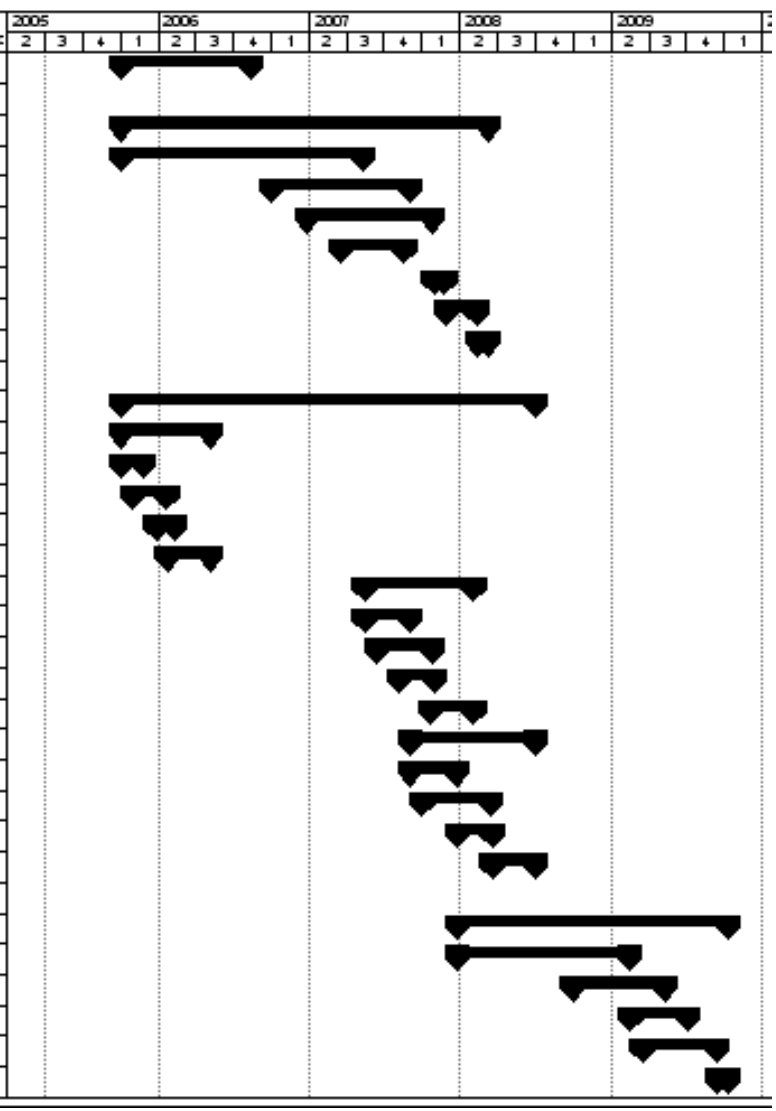
- FY08
  - Design
    - D1 magnet, tooling
  - Make/Buy
    - D1 superconductor (50%)
  - Assembly
    - 4M W&R coils
  - Test
    - POP #1 and #2
    - 4M W&R coils

4 Year Plan (milestones)

- FY09
  - Design
    - n/a
  - Make/Buy
    - D1 superconductor (50%)
    - D1 magnet parts, tooling
  - Assembly
    - D1 model magnet
  - Test
    - D1 model magnet

Schedule

ID			Duration	Start	Finish	Predec
1		12T open midplane	226 days	Mon 10/3/06	Fri 8/11/08	
8						
9		POP	636 days	Mon 10/3/06	Fri 3/7/08	
10			420 days	Mon 10/3/06	Fri 6/11/07	
16			240 days	Mon 10/2/08	Fri 8/31/07	
22		In stallation	220 days	Mon 12/26/08	Fri 10/26/07	
26		Assembly	110 days	Mon 3/19/07	Fri 8/17/07	
29		Test	20 days	Mon 10/29/07	Fri 11/23/07	
31		Mods, Iteration	66 days	Mon 11/26/07	Fri 2/8/08	
35		Test	20 days	Mon 2/11/08	Fri 3/7/08	
37						
38		W&R Coil R&D	718 days	Mon 10/3/06	Mon 6/30/08	
39			166 days	Mon 10/3/06	Fri 6/6/08	
40			40 days	Mon 10/3/06	Fri 11/26/06	
43		Procurement/ Fabrication	60 days	Mon 10/31/06	Fri 1/20/08	
46		In stallation	36 days	Mon 12/26/06	Fri 2/10/08	
49		Test	76 days	Mon 1/23/08	Fri 6/6/08	
54		1M Coils	180 days	Mon 6/14/07	Fri 2/1/08	
55		Design	80 days	Mon 6/14/07	Fri 8/31/07	
60		Procurement/ Fabrication	100 days	Mon 8/11/07	Fri 10/26/07	
65		In stallation	61 days	Mon 8/6/07	Mon 10/29/07	
70		Test	76 days	Mon 10/22/07	Fri 2/1/08	
75		4M Coils	218 days	Mon 9/3/07	Mon 6/30/08	
76		Design	80 days	Mon 9/3/07	Fri 12/21/07	
81		Procurement/ Fabrication	120 days	Mon 10/1/07	Fri 3/14/08	
86		In stallation	61 days	Mon 12/24/07	Mon 3/17/08	
91		Test	76 days	Tue 3/18/08	Mon 6/30/08	
96						
97		D1 model magnet	470 days	Mon 12/24/07	Fri 10/9/09	
98			300 days	Mon 12/24/07	Fri 2/13/09	
104			160 days	Mon 9/29/08	Fri 5/8/09	
110		In stallation	100 days	Mon 2/16/09	Fri 7/3/09	
114		Assembly	130 days	Mon 3/16/09	Fri 9/11/09	
117		Test	20 days	Mon 9/14/09	Fri 10/9/09	



(Preliminary) Budget

	FY06				FY07				FY08				FY09				Overall w/OH
ITEM	Labor	Material	Total Direct	Total w/OH	Labor	Material	Total Direct	Total w/OH	Labor	Material	Total Direct	Total w/OH	Labor	Material	Total Direct	Total w/OH	
D1 Design	$176,755	$26,000	$202,755	$283,113	$183,825	$8,000	$191,825	$270,397	$191,178	$8,320	$199,498	$281,213	$198,825	$8,653	$207,478	$292,462	$1,127,185
1M Proof of Principle Cold Mass	$597,468	$246,200	$843,668	$1,156,852	$237,806	$575,500	$813,306	$1,063,360	$150,888	$32,860	$183,748	$255,147					$2,475,359
Open Midplane 12T magnet Tests	$88,014	$37,744	$125,758	$172,284													$172,284
Wind and React Coil R&D	$85,706	$43,500	$129,206	$176,283	$212,194	$186,650	$398,844	$536,131	$29,641	$163,650	$193,291	$248,596	$29,641	$163,650	$193,291	$248,596	$1,209,608
4M D1 Cold Mass									$543,504	$356,500	$900,004	$1,219,719	$425,808	$982,435	$1,408,243	$1,843,366	$3,063,085
Direct Costs	$947,933	$353,444	$1,301,377		$633,826	$770,150	$1,403,976		$915,212	$561,330	$1,476,542		$654,275	$1,154,738	$1,809,012		
Costs w/OH	$1,342,273	$446,258		$1,788,532	$897,497	$972,391		$1,869,889	$1,295,940	$708,735		$2,004,675	$926,463	$1,457,972		$2,384,425	$8,047,520